Elliptic integrals and the Jacobi elliptic functions

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We review the definitions, basic properties, and some applications of the Legendre elliptic integrals and the Jacobi elliptic functions. For instance, the perimeter of an ellipse is most simply expressed in terms of the complete Legendre elliptic integral of the second kind, and is why the functions are so named. The Jacobi elliptic functions are functions of two variables, one of which, known as the modulus, m, is normally taken as a parameter. They can be regarded as generalizations of the trigonometric and hyperbolic functions since as $m \to 0$ ($m \to 1$) they tend to the former (latter). A classic example of their application is the expression of the solution of the pendulum equation $\ddot{\theta} + \omega^2 \sin\theta = 0$ in closed form.